

Association for Information Systems AIS Electronic Library (AISeL)

PACIS 2014 Proceedings

Pacific Asia Conference on Information Systems
(PACIS)

2014

VALUE CREATION THROUGH INTER-ORGANIZATIONAL SYSTEMS (IOS): FROM GOVERNANCE PROCESS VIEW

Shuting Zhu

Southeast University, shutingzhu@gmail.com

Weijun Zhong

Southeast University, zhongweijun@seu.edu.cn

Shu'e Mei

Southeast University, meishue@seu.edu.cn

Follow this and additional works at: <http://aisel.aisnet.org/pacis2014>

Recommended Citation

Zhu, Shuting; Zhong, Weijun; and Mei, Shu'e, "VALUE CREATION THROUGH INTER-ORGANIZATIONAL SYSTEMS (IOS): FROM GOVERNANCE PROCESS VIEW" (2014). *PACIS 2014 Proceedings*. 304.
<http://aisel.aisnet.org/pacis2014/304>

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2014 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

VALUE CREATION THROUGH INTER-ORGANIZATIONAL SYSTEMS (IOS): FROM GOVERNANCE PROCESS VIEW

Shuting Zhu, School of Economics and Management, Southeast University, Nanjing, China,
shutingzhu@gmail.com

Weijun Zhong, School of Economics and Management, Southeast University, Nanjing, China,
zhongweijun@seu.edu.cn

Shu'e Mei, School of Economics and Management, Southeast University, Nanjing, China,
meishue@seu.edu.cn

Abstract

In this study, we seek to reveal the mechanism of value creation between firms and their partners in B2B context. An integrated conceptual model is constructed grounded in the co-creation theory and the process view, which proposes the interaction between relational assets, IOS support and governance process, as well as their impacts on co-created value. It differs from previous studies by highlighting the mediating effect of governance on value creation. Using a sample of 181 collected from China, our analysis indicates the contribution of governance to co-created value, which is generated through IOS and relational assets. In fact, the IOS support and relational assets alone don't hold the answer to value co-creation, but they affect the mediating process and enable governance to create value. Especially, the IOS could accommodate the use of relational assets and significantly affect governance process, which is found to be fundamental in value creation. While commodity-like resources have diminishing value in co-creation, governance process with causal ambiguity, social complexity and organizational interconnectedness, becomes the main source of co-created value. Overall, our research sheds light on the key drivers of value co-creation, and provides insights to their impacts on value creation.

Keywords: IOS support, relational assets, governance process, value co-creation.

1 INTRODUCTION

The relationship among firms has changed significantly with economic globalization and information technology. Accordingly, new theory has been proposed as service-dominant logic, focusing on relationships and value co-creation (Vargo & Lusch 2004), which broadens the perspective of value creation and implies that all social and economic actors are service providing, value-creating organizations. So in this sense, all exchange can be considered B2B (Vargo & Lusch 2011). Moreover, the innovative application of information systems is crossing traditional firm boundaries, which is recognized as inter-organizational systems (IOS) (Gallivan & Depledge 2003). As the digital enabler, IOS have fundamental impacts on resources and capabilities among firms, and governance the B2B relationships effectively (Krishnan et al. 2007). Therefore, value co-creation and IOS have become important topics in IS research (Grant & Tan 2013).

However, many firms find it hard to gain and sustain relational advantages in current market environment and emerging technology (Day et al. 2004). What are the metrics and factors in value co-creation? How these factors interact with each other? Furthermore, although many scholars have pointed out the importance of governance, which mainly discussed on the role and structure, we have limited insights in the governance process. That is the subject we concern in this paper. What governance process is best suited for the value creation in B2B context? How dose IOS deliver better performance for B2B participants?

To probe into these questions, we draw on insights from governance process view and particularly explore Zwass' (2010) framework which indicated the factors in co-creation. We enrich the discussion by incorporating insights from governance process, and our work expands the framework of value creation to B2B, which contains main factors of relational assets, digital enabler and governance process, revealing the mechanism how value generates through IOS. This paper contributes new evidence on how IOS affect value creation with the mediating role of governance process, bridge the gap between IOS applications and value creation in IS research, which is not found in previous studies. Furthermore, this study helps firms in practice understand the process of value co-creation, governance the relationships with their partners effectively, and facilitate IOS to deliver better outcomes, which promises innovative strategy for B2B firms.

In this paper, we develop a conceptual model grounded in value co-creation theory and governance process view. We derive sets of hypotheses from the research model, and test them on a sample of 181 firms from China. Our work lay out as the following: First, we present the theory foundation. Then, we propose the research model and derive corresponding hypotheses. This is followed by a description of the methodology and the results of our empirical analysis. The paper closes with discussion of findings, limitations, and implications for research and practice.

2 THEORETICAL FOUNDATIONS

2.1 Value Co-creation in B2B Context

Value co-creation, as Prahalad and Ramaswamyn's (2004) research, emphasizes cooperation among firms sharing knowledge and experience for high-quality interactions and coordination to co-create value. Zwass (2010) studies the growing productive force in e-commerce and proposes the framework of factors in co-creation. Whereas he points that enabling IT needs to be developed to suit this context, IT support does not benefit from his framework, while in our research we refine the framework considering IOS as the main IT enabler. Furthermore, value co-creation in IS field is framed through different layers of relational arrangement among firms, where the fundamental layer is assets (Glover

& Kohli 2012), which is included in our research as resource of co-creating value and reconfigure the relational arrangement aligned with B2B context.

According to the framework of value creation in B2B context, the open, interactive and mutually beneficial cooperative mechanism should form to develop relationships among firms, and the migration to open-standard IOS promises the basis technology infrastructure (Zhu & Kraemer 2006), which will prompt partners to share knowledge and experience actively. What's more, the governance process of value creation will become core competence of firms in future.

2.2 Governance Process View in IS Research

The process view in IS research explains the path how IS enhance firm competitive advantage, and explores the possible mediating and moderating factors, as well as the interaction between the factors. Soh and Markus (1995) firstly propose the process models to trace the path from IT investment to business value. It indicates the process from resources to firm performances, involving independent and dependent variables, as well as intermediate variables such as organization management, business operations or individual behaviors. The process view interprets the conversion from resources and capabilities to business value under the moderation of the firm level properties, and provides an interpretative theory to reveal the mechanism of value creation.

One implication of the process view is to highlight know-how as the intermediate outcomes. In this paper, we emphasize the governance process as the key mediate factor. On one side, governance concerns the participants of stakeholders, managers, creditors, employees, customers, community, and other multi-interest related entities. On the other side, the core issue that governance focuses on is the value creation and the effective appropriation to different interest related entities, which is also our main concern on B2B value creation. The emerging IT enablement affects governance based on shared group norms and integrated process, despite formal or relational governance. Furthermore, in the open, interactive and mutually beneficial cooperation, governance is even more important for value creation. Therefore, we choose governance as the main process in our conceptual model.

Inspired by the value co-creation and governance process view, we set relational assets as the basis of co-created value, combined with IOS as the main IT enabler. Governance process is the mediating factor in our model, which reveals the mechanism of value creation based on the process view. The conceptual framework is shown as Figure 1:

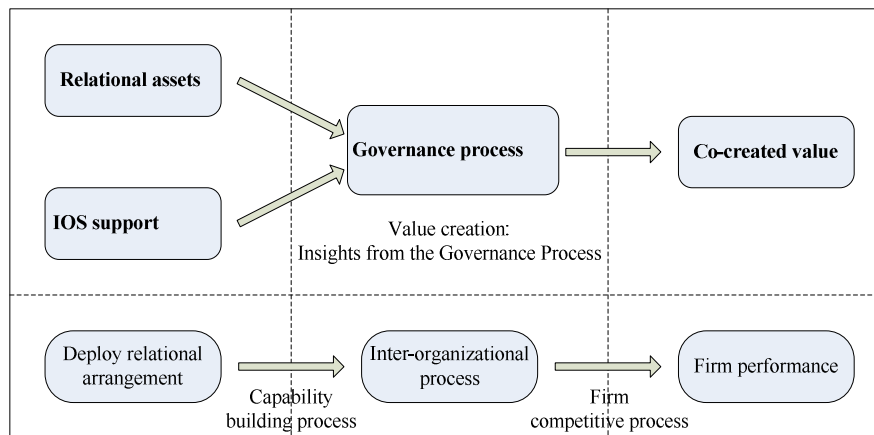


Figure 1 Conceptual Framework

3 RESEARCH MODEL AND HYPOTHESES

3.1 Research Model

We propose the research model of value creation as shown in Figure 2. The co-created value is measured by the economic and social performance of partners, while the bases of value creation are identified as relational assets and IOS support. Governance mediates the process, revealing the mechanism of value creation. Hypotheses are recommended for empirical analysis.

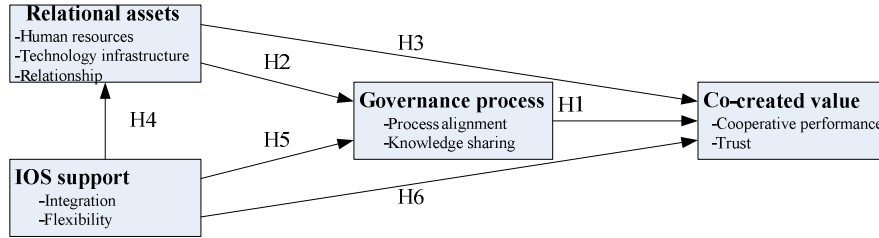


Figure 2 Research Model

3.1.1 The Dependent Variables: Co-created value

Co-created value reaches beyond the cost/benefit conception of value (Biggemann & Buttle 2012). This paper investigates co-created value from both economic and social aspects. The former aspect emphasizes the improved cooperation between firms and their partners, while the latter focuses on the norms and ties derived from cooperative relationships. Cooperative performance reflects the alignment of firms' objectives, and the value appropriation between firms (Bunduchi 2005). Trust presents the trait embedded in relationship, which underlines the enduring and adaptable metrics of relationships (Vargo & Lusch 2008), ensuring the success of cooperation to co-create value. Therefore, we propose cooperative performance and trust as the measurements for co-created value, demonstrating the success of cooperative relationships respectively from economic and social aspects.

3.1.2 The Independent Variables: Key resources and enabler

From the relational view, relational assets are the interactions of complementary resources inter firms, forming heterogeneous resources and capabilities through combination, which are essential for competitive success (Dyer & Singh 1994). Researchers have proposed three strategic assets (Ross et al. 1996), and firms can deliver value from IT enablers by using and leveraging the three assets, which conclude competent human resources, reusable technology infrastructure and strong business partner relationship. As B2B firms seek to improve their relationships and coordination through the use of electronic interorganizational systems (Zhu et al. 2006), IOS has been seen as the digital enabler for open and interactive B2B. Since key assets and IT capabilities has operated as systems of complements (Rai & Tang 2010), we set relational assets and IOS support as the independent variables in this research.

3.1.3 The Mediating Variable: Role of governance

Governance affects firms' commitment to cooperate (Xiao et al. 2013), playing the important role in sustaining power relationships to co-create, especially in inter-organizational context including various interest entities. However, much literature focuses on the governance role or structure, little touches upon the governance process. It has been verified that firms in networks create and capture value

depending on the effective governance of resources and capabilities in the relationships (Morgan et al. 2013). Firms co-create value from knowledge exchange and partner alignment through the governance process. Accordingly, governance process lies in two levels of process alignment and knowledge sharing in this paper, which is detailed in Table 1.

Levels	Extent	Definition	Function	Reference
Process alignment	Operational	Integration of partners' process at the operational level across firm boundaries.	Firms strengthen the cooperative specialization through process alignment, which provides joint support for market opportunity sense & respond, improve partners' satisfaction and loyalty.	Robicheaux and Coleman (1994).
Knowledge sharing	Strategic	Transmission, re-combinations and creation of specific knowledge between firms and their partners.	Knowledge embedded in the relationships helps firms acquire new skills from their partners, resulting in improved performance through technological innovation, better and faster response to partners' demands.	Grant (1996).

Table 1 Governance process level

From the discussion above, relational assets and IOS support impact value co-creation when combined into strategic resources, while governance process plays as the mediating factor, which is evidently affected by relational assets and IOS.

3.2 Research Hypothesis

3.2.1 Governance Process

The cooperative relationships emphasize the joint capabilities and collaborative advantage between firms and their partners (Dyer 2000), while governance enables this process. Since marketing is a process of interaction among business partners, active participants engage in relational knowledge exchanges and coproduction, and the key point is to co-create value through the integrated process between firms and partners (Vargo & Lusch 2008). As we have discussed, governance process could improve partners' satisfaction and loyalty, support to sense and respond to market opportunity quickly, which is directly related to partner trust and cooperative performance. So in this sense, we give the proposal that:

H1: Governance process is positively related to co-created value.

3.2.2 Relational Assets

Governance process is typically embedded in social relationships, and emerges from the deployment and combination of relational assets, which may enhance the cooperation during the value creation (Dyer & Singh 1998; Dyer 2000). For such governance process, the enforcement of relational assets, such as the competent human resources, reusable technology infrastructure and strong business partner relationship through value creation will promote information exchange and process alignment. Thus we propose that:

H2: Relational assets have direct positive impacts on governance process.

Relational assets could support value co-creation and explore competitive potential for firms (Ngugi 2010). Moreover, studies in IS field based on the resource based view shows that resources and capabilities have the direct (Bhatt & Grover 2005) or indirect (Ravichandran & Lertwongsatien 2005) impact on firm's business value. Meanwhile, the three dimensions of the relational assets have effect on business value. Accordingly, we propose in this paper that:

H3: Relational assets have direct positive impacts on co-created value.

3.2.3 IOS Support

According to the study of Saraf et al. (2007), integration and flexibility derived from the technology enablement, as the IOS support in this paper, represent efficiency and flexibility respectively, both of which are essential since they could balance firms' need to maintain adaptable electronic links with multiple partners and at the same time maintain sufficient richness so as to support the creation of relational assets. Therefore, we propose that:

H4: IOS support is positively related to relational assets.

It has been empirically studied that the supporting role of IOS directly affects the governance (Robey et al. 2008). The feature of integration, defined as the IOS applications of a firm working in conjunction with its partners', impacts the functional level. The process alignment, as well as knowledge sharing between firms and partners could be achieved through the IOS components support (Straub & Watson 2001). The feature of flexibility is recognized as how to configure IOS applications to quickly and economically adapt to changing business requirements. Flexibility enables firms to support new business relationships and easily accommodate changes, which is of strategic importance for governance. Previous studies have showed that IOS support as the technology enabler could positively affect process alignment and knowledge sharing (Saeed et al. 2005). Hence, we expect that:

H5: IOS support is positively related to governance process.

The empirical results of Bharadwaj et al. (2007) show that the complementary effect of firms' IS capability and business process is significant predictors of firm performance. Rai et al. (2012) proved that IT capability profiles could help firms co-create value. In summary, the enablement of IOS support could enable firms maintain adaptable and rich links with partners, strengthen the relationships and improve the coordinative performance. On account of these discussions, we propose that:

H6: IOS support is positively related to co-created value.

4 THE EMPIRICAL STUDY

4.1 Data and Measures

4.1.1 Data

We used the data collected in China from December 2012 to August 2013 through survey questionnaire to verify our research model and the hypotheses. A pilot test was conducted before the formal data collection. We choose MBAs in a Chinese university, whose are engaged in IT department, to fulfill the questionnaire at site, and collected a sample of 43 used for instrument validation and refinement. Then we distributed the survey to the alumni of a school of economics and management using email or letters, and requested the alumni to bring the questionnaire to their department leaders in their firms. A total of 260 questionnaires were distributed, 203 questionnaires were received excluding the unqualified ones which were incomplete or with the same rating to all the items.

In this study, we use two criteria to select eligible data for analysis: First, the firms belong to manufacturing industry. Second, the firms have implemented the IOS applications. We chose the manufacturing firms for two reasons. First, it helps control industry specific effects. Second, manufacturing industry firms rely more on the relationships between their upstream providers and downstream customers, such as the material suppliers, contract manufacturers, logistic providers, and downstream partners (Subramani 2004), they emphasize the value co-creation between the partners. Numerous studies have suggested manufacturing firms coordinate with the partners through digital

enabled management (Zhu & Kraemer 2002). Therefore data from the manufacturing industry is an appropriate testing field for our model.

We choose qualified questionnaires based on the criteria. Finally, we got the sample of 181 for our data analysis. The effective response rate is 69.61%.

4.1.2 The Measurement Instrument

We use seven-point Likert scale (7 point means strongly agree, 4 point means neutral, 1 point means strongly disagree) to design our measurement items. The items in our constructs were adapted from previous scales from literature review, in which the validity and reliability had been tested and verified. And we use the standard scale development process developed by Hinkin (1998) to modify our scale for the alignment with Chinese context according to the following two steps. First, an expert panel of two IS professors, two IS researchers, three IS or business executives examined the scale for content validity of the measurement items. Second, the measurement instrument is pilot tested using our sample of 43 MBAs in the pre-formal survey. Constructs and scale items of the measurement instrument are represented in Appendix A.

- Relational assets. We measure relational assets according to scales of Jayachandran et al. (2005), Ravichandran and Lertwongsatien (2005), Banker and Bardhan (2006). It captures three aspects of technology infrastructure, human resources and relationship. There are ten items for this construct.
- IOS support. In this study, IOS support is measured referring to the scales of Rai and Tang (2010), Saraf et al. (2007), Tafti et al. (2013), which focus on the IOS application quality of integration and flexibility, and concludes eight measurement items.
- Governance process. We design governance process as a second-order formative construct consisting of two first-order reflective constructs of process alignment (Provan et al. 2007; Chong & Tan 2012) and knowledge sharing (Xiao et al. 2013), which are measured by seven reflective items.
- Co-created value. A new scale is developed to measure co-created value in this study, which comprises two aspects: (1) Profit sharing (Kohli & Grover, 2008; Rai et al. 2012); (2) Trust (Morgan et al. 2013). Each aspect is measured by four items.

4.1.3 The Survey Bias

The data in the final sample were checked for non response bias, as well as the common method bias. No significant biases were found in terms of number of responses and respondents' titles. In addition, respondent positions (IS or non-IS managers) did not cause significant biases in the data ($p > 0.05$).

Common method bias (CMB) is a potential concern, since the data were self-reported (Podsakoff et al. 2003). We applied procedural remedies, such as protect respondent anonymity, counterbalance some questions' order, and retest items to reduce CMB. In addition, we use Harman's single-factor test to assess the severity of CMB. The test on all of the reflective constructs indicated that a single dominant factor was not present and the largest factor accounted for only 19.76 percent of total variance. Therefore, CMB does not seem to be a serious concern in this study, which consistent with the study of Malhotra et al. (2006) that CMB does not significantly affect IS study based on single-source survey data.

4.2 Analysis and Results

4.2.1 Second-Order Construct Validation

Confirmatory factor analysis is the conventional statistical method used to specify and test abstract concept or latent variable, assess the measurement validity and reliability, and verify the constructs

structure model based on a particular theory and assumptions (Brown 2006). Figure 3 shows the estimation of the second-order construct for governance process using AMOS 17.0.

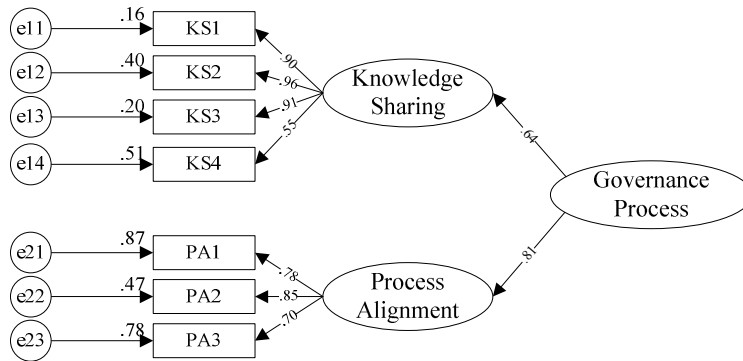


Figure 3 CFA for Second-Order Construct

Notes: Each regression weights in this figure is significant ($p < 0.01$). The primary Model Fit: CMIN=21.159; DF=13; $\chi^2/DF=1.628$; NFI=0.976; RFI=0.949; IFI=0.991; TLI=0.980; CFI=0.991; RMSEA=0.059.

As showed in Figure 3, each regression weights in this figure is above 0.55 and significant at the p level < 0.01 . The ratio of χ^2 to Df is 1.63, much smaller than 3, while the index of GFI, NFI, RFI, IFI, TLI, CFI are all above 0.94 showing the justified fit for the hierarchical model (Hair et al. 2006)). RMSEA < 0.05 indicates the model fit quite well, but the model is acceptable in the RMSEA range of 0.05-0.08 in social science research (Browne and Cudeck 1993). What's more, as Appendix B shows, the index of Cronbach's α (> 0.70), average variance extracted (AVE > 0.50), construct reliability (> 0.70) confirm the reliability and validity of our second-order construct (Hall et al. 1999). Therefore, the second-order construct for governance process is verified both theoretically and empirically.

4.2.2 Measurement Model Test

In this part, we test the reliability and validity of our measurement model. As shown in Appendix B, the load of each item to its construct is above 0.5, the Cronbach's alpha value lies in the range of 0.89 to 0.97, and the composite reliability (C.R.) of each construct is above 0.8, showing acceptable reliability. We also assess the validity of these constructs. For example, the loads of the six items to relational assets are all above 0.5 (we delete the items whose load under 0.5 according to this criterion.), and they are significant at the p -level of 0.001, which shows acceptable convergent validity. The AVE value is 0.528, for the six items are well identifications of the relational assets, which shows the acceptable discriminate validity of this construct. In sum, our measurement model has quite reliability and validity, and could measure the latent variables well in our research.

We report the descriptive statistics, including mean, variance and correlation between the variables in Table 2. We can see from the table that the variables are positively related with each other. For example, the relational asset is positively related with IOS support ($r=0.619$; $p < 0.01$), which has been discussed in our previous section (r presents the correlation in this table).

Construct	Mean	S.D.	Cronbach's α	C.R.	RA	IOS	GP	CV
1. Relational assets (RA)	5.06	0.92	0.816	0.870	1			
2. IOS support (IOS)	4.61	1.17	0.886	0.917	.619**	1		
3. Governance process (GP)	4.58	1.05	0.894	0.913	.676**	.890**	1	

4. Co-created value (CV)	4.65	1.38	0.966	0.972	.419**	.665**	.753**	1
--------------------------	------	------	-------	-------	--------	--------	--------	---

Table 2 Mean, S.D. and Correlation

Notes: $N = 181$, ** $p < 0.01$, Correlation is significant at the 0.01 level (2-tailed).

4.2.3 Hypothesis and Mediation Test

In this paper, we use smartPLS to calculate the path coefficients in our research model based on the partial least squares method, which is tolerant to the distribution and scale of the sample compared with the structure model method based on covariance matrix. Bootstrapping algorithm ($N = 1000$) is use in our research to test the significance of the path coefficient. We test the model fitting use GoF (Tenenhaus et al. 2005), which is 0.61 much higher than the impacting threshold value 0.36. The path coefficient and R^2 value is showed as following.

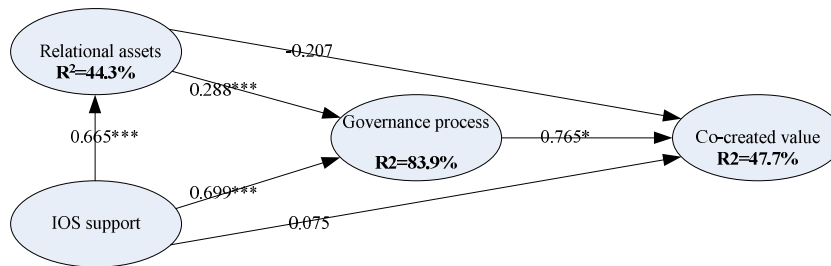


Figure 4 Path coefficients and R^2

Notes : * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

The explanatory power of our model is indicated by R^2 , which represents the extent of the variances to latent variables. As showed in Figure 4, the R^2 of co-created value reaches 47.7%, which explains 47.7 percent of the variance of co-created value. The 83.9 percent of the variance of governance process is explains by its latent variables, and R^2 of relational asset explains 44.3 percent of its variance. Each construct is explained sufficiently, guaranteeing the reliability and accuracy of the research model.

The path coefficients and the significances are tested using Bootstrapping ($N=1000$). Table 3 reports the hypothesis testing results, as well as the original hypothesis.

Hypotheses	Path	Coefficient	P-level	Test results
H1	Governance process ---> Co-created value	0.765*	0.035	Support
H2	Relational assets ---> Governance process	0.288***	<0.001	Support
H3	Relational assets ---> Co-created value	-0.207	0.082	Not Support
H4	IOS support ---> Relational assets	0.665***	<0.001	Support
H5	IOS support ---> Governance process	0.699***	<0.001	Support
H6	IOS support ---> Co-created value	0.075	0.213	Not Support

Table 3 Path coefficient and test results

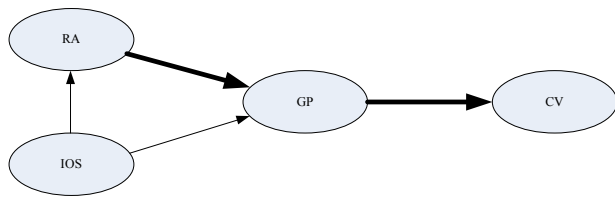
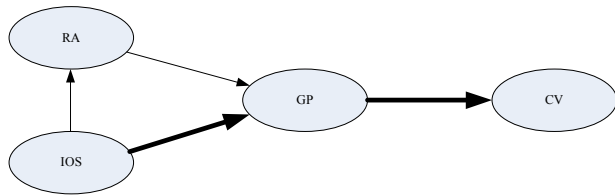
Notes : * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

From the Table 3, the path coefficient between governance process and co-created value is 0.765, significant in $p < 0.05$ level, showing the strong positive linkage form governance process to co-created value. H1 is supported by our research. Similarly, the path coefficients of 0.288, 0.665, 0.699 ($p < 0.001$) indicate the strong related between the constructs positively, and significantly support H2, H4 and H5.

However, H3 and H6 are not supported whose testing fails to reach the significant level in this research.

We followed the process proposed by Patnayakuni et al. (2006) and Malhotra et al. (2007) to test the mediation effects of governance process in our research model. As our PLS analysis has tested the direct effects from relational assets to co-created value, either from IOS support to co-created value are not significant ($p > 0.08$). It has been statistically tested that the direct effect of the independent variables (IVs) couldn't explain additional variance in the dependent variable (DV) beyond the mediated effects through the mediating variable (MV). Therefore, we assess the significance of the mediation effect using Patnayakuni et al. (2006) and Subramani's (2004) analysis techniques.

Mediation analysis is based on the path coefficients and the standard errors of the direct paths between relational assets and IOS support (IVs), governance process (MV) and co-created value (DV). The magnitude of mediation is computed as the interaction of the standardized path coefficients between relational assets and governance process (IV-MV) and between governance process and co-created value (MV-DV). A similar computation is done for the mediated path between IOS support and co-created value. The standard error of the mediated path is computed based on the standardized path coefficients and standard deviations of the direct paths among the independent, mediating, and dependent variables obtained from the PLS (Patnayakuni et al. 2006; Subramani, 2004). The mediation test results are showed as Table 4.

Indirect Effect	Mediated Path	Graphical Model	Mediated Coefficient	z-statistic
RA-CV	RA-GP-CV		0.22	0.34*
IOS-CV	IOS-GP-CV		0.53	0.69*

Notes: * Significant at $p < 0.05$ (One-tailed test)

Table 4 Test of Mediation: Mediated Path Analysis

The magnitude of mediation effect was 0.22 (RA-GP-CV) and 0.53 (IOS-GP-CV) for each of the two antecedent constructs. The z-statistic is calculated using an approximation for the standard error of the mediated path. The approximated standard error is computed using the formula $\sqrt{p_1^2 s_2^2 + p_2^2 s_1^2 + s_1^2 s_2^2}$, where p_1 is the path coefficient of the path from IV to MV, p_2 is the path coefficient from MV to the DV, while s_1, s_2 are the corresponding standard deviations, and the z-statistic for the two paths is 0.34 and 0.69 respectively, which are significant at $p < 0.05$.

The test of mediation illustrates there's complementary to be considered (Subramani, 2004). The mediation analysis shed light on the significance of mediation effects, providing further support for our research model.

5 DISCUSSION

5.1 Major Findings

First, governance process is strongly related with co-created value with the path coefficient of 0.765 in our research, which indicates the significant impact of governance process to value creation. This finding is aligned with our theoretical research that B2B firms rely on the relationships between their partners to co-create value, and the governance could significantly coordinate the relationships to generate value between firms and their partners.

Second, Relational assets and IOS support don't have the direct impact on value co-creation. The hypotheses that relational assets and IOS support is directly related to value co-creation are not supported according to our test. This result is not unexpected. Although relational assets and IOS support are important factors in value co-creation process, they couldn't generate value directly for their commodification in the technology environment. Relational assets are hard to transcend the prior investment path due to the path dependency. Even though the IOS support is valuable, the systems are easy to imitate and replicate due to the open-standard and facilitate access in technology market as the basic infrastructure. Therefore, they couldn't be the direct source of co-created value.

Third, IOS support is important in affecting the relational assets and governance process. H4 and H5 indicate the significant impact of IOS support on the relational assets and governance. Firms communicate and improve their relationships through IOS, while the integration and flexibility of IOS could support the knowledge sharing and process alignment of the governance during the value creation process.

5.2 Theoretical and Managerial Implications

In the theory, our research extends the co-creation framework to B2B and IOS, fulfill the governance process to bridge the gap from mainly factors to value creation, and reveal the mechanism of value co-creation from the process view, which has great implications to co-creation and governance process theory. Our findings add to the IS governance literature by highlighting the role of governance process in value co-creation. This work also emphasizes the fact that IOS and relational asset not impact value creation directly, but complementary to governance in the value creation process. Therefore, co-creation studies should condition the role of specific governance process. Our research provides some preliminary evidence for this general theoretical proposition, and serves as a base for future study.

Our study offers several implications for managers. First, managers should bear in mind that governance is critical to create value in B2B. Internet has made the business environment more interconnected in the global scale. Firms no longer work alone, and they have to coordinate with their business partners. Effective governance could improve their relationships, which will harvest great benefits from value co-creation. Moreover, the causal ambiguity of the governance process, as well as the inter-organizational asset interconnectedness and the social complexity, make governance hard to imitate or replicate, which is more apt to be the source of co-created value.

Second, our research identifies that IOS has great impact on relational assets, and is critical for the success of governance. Managers should take IOS into consideration when leverage the relational assets and govern the relationships based on digital connections and information sharing. In particular, firms need to strengthen the cooperative relationships through IOS, and strengthen the flexibility to accommodate new business relationships and changes in business requirements quickly. IOS support is even more important in the dynamic environment.

Third, IOS support and relational assets are complementary to co-create value. Although they don't generate value directly, it is crucial for firms to achieve a strategic fit between IOS support and relational assets. They should proactively develop IOS to impact relational assets so as to achieve

better technology infrastructure, human communication and relationship between firms and their business partners.

5.3 Limitations and Future Research

The key limitations and suggestions for future research are discussed below. First, the survey is collected from a single respondent each firm for both the independent and dependent variables, which might result in biases because of common method variance. Although we have tested CMV that didn't bias our data in this research, multiple measurement methods and data sources are desired to control potential common method bias in the future (Burton-Jones, 2009).

Second, it will be useful to use accounting data to test the co-created value, such as return on assets and return on investment, but we are unable to do so in this analysis. The measurement item should be refined in future research according to the new market environment and technology.

Third, we use cross-sectional data to test our model in this research. Since the data reflect the situation in a time point, it is difficult to explain the causal relationships between the constructs, or it couldn't address the issue how value is co-created over time. Longitudinal data should be used in the future study to provide empirical evidence.

6 CONCLUSIONS

As B2B firms seek to co-create value through inter-organizational systems, the main factors and mechanism of the value creation is concerned by theory and practice. Facing coordination with their partners, firms need to strengthen their relational assets and IOS support for the effective governance. Therefore, there is a growing need to understand which factors are likely to affect the value co-creation process and how they interact with each other.

Drawing upon the co-creation theory and the process view, we develop the conceptual model to examine the influential factors in the process of value co-creation. Unlike much of the research in the value creation literature, our research brings in governance process to reveal the mechanism of value creation. Hypotheses are derived from the research model and tested using the survey data from China. The empirical results gauged the significant role of relational assets, IOS support and governance in value co-creation process, confirming the theoretical perspectives in this paper. We further tested the mediated variables that contribute to manage the relationships and co-created value. It's found that governance process is key determinant for co-created value, while relational assets and IOS, as opposed to some previous studies, have no direct impact on value significantly. Thus, it appears that governance process in value co-creation is critical to successful coordination between firms and their partners. In addition, we find that IOS and relational assets are complementary resources for value creation. We hope this work will stimulate more research to further explore the issues of value co-creation in emerging environment.

Appendix A: Constructs and Scale Items

Constructs and Items

Relational assets (RA)

- | | |
|-----|---|
| RA1 | The technology infrastructure needed to electronically link our firm with external business partners (i.e., key customers, suppliers, alliances) is present and in place today. |
| RA2 | The capacity of our network infrastructure adequately meets our current business needs. |
| RA3 | Corporate data is currently sharable across business units and organizational boundaries. |
| RA4 | We have standardized the various components of our technology infrastructure (i.e., hardware, OS, network, database). |
| RA5 | Employees in our firm have the ability to cope with the affairs arising from cooperation. |
| RA6 | Employees in our firm are willing to communicate and cooperate. |
-

RA7	Employees in our firm could quickly learn to use new technologies or systems.
RA8	We can rely on our business partners respond to our business needs in timely and effective manners.
RA9	A very trusting relationship exists between our firm and our key business partners.
RA10	We have long-term partnerships with our key business partners.
IOS support (IOS)	
IOS1	We successfully integrated most of our information systems applications with our business partners.
IOS2	Data are entered only once to be retrieved by most applications of our business partners.
IOS3	We can easily share our data with our business partners through the inter-organizational systems.
IOS4	Information systems applications on multiple machines of multiple partners are interoperable with each other across our inter-organizational systems.
IOS5	The manner in which the components of our information systems are organized and integrated allows for rapid changes.
IOS6	Our inter-organizational systems are designed to support new business relationships easily.
IOS7	Our inter-organizational systems are designed to accommodate business requirement change quickly.
Governance process (GP)	
KS1	We have the norms of business information sharing with our partners.
KS2	We frequently share knowledge about our business environment (e.g., other business relationships) with our partners.
KS3	Knowledge about our providers, customers, competitors, etc., is shared with our partners.
KS4	Business insights are exchanged between us and our business partners.
PA1	Our firm has inter-organizational working programs.
PA2	Our way of doing business is closely linked with our partners.
PA3	Business procedures and routines of our firm are highly coupled with ones of our business partners.
PA4	To operate efficiently, we rely on procedures and routines of our business partners.
Co-created value (CV)	
CV1	Through governance, we significantly improve the transaction efficiency with our business partners.
CV2	Through governance, we significantly improve the trading accuracy with our business partners.
CV3	Through governance, the partnerships between our firm and the partners are more stable.
CV4	Through governance, we significantly improve the satisfaction of our partners in cooperation.
CV5	Through cooperation with partners, we enhance the efficiency of response to market changes.
CV6	Through cooperation with partners, we reduce the logistics costs.
CV7	Through cooperation with partners, we improve the quality of product, service and business process.
CV8	Through cooperation with partners, we increase sales revenue.

Appendix B Evaluation of the measurement model

Item	Mean	S.D.	Load	Cronbach's Alpha if Item Deleted	P level
Relational assets (RA): Cronbach's Alpha=0.816, AVE=0.528, Composite Reliability=0.870					
RA1	25.31	21.590	.560	.792	<0.001
RA4	24.99	22.123	.614	.781	<0.001
RA5	25.44	22.058	.525	.799	<0.001
RA7	25.56	21.634	.617	.779	<0.001
RA8	25.48	20.910	.567	.792	<0.001
RA10	25.03	22.765	.620	.782	<0.001
Refinement from initial model: Delete RA2, RA3, RA6, RA9.					
IOS support (IOS): Cronbach's Alpha=0.886, AVE=0.617, Composite Reliability=0.917					
IOS1	27.900	46.928	.789	.866	<0.001
IOS2	27.506	52.966	.613	.888	<0.001
IOS3	27.444	53.142	.686	.880	<0.001
IOS4	27.444	54.796	.583	.891	<0.001
IOS5	27.728	47.093	.823	.862	<0.001
IOS6	27.850	46.888	.841	.860	<0.001
IOS7	27.828	53.741	.531	.897	<0.001
Governance process (GP): Cronbach's Alpha=0.894, AVE=0.569, Composite Reliability=0.913					
KS1	32.57	53.711	.576	.883	<0.001
KS2	31.82	57.156	.659	.872	<0.001

KS3	32.20	56.083	.583	.879	<0.001
KS4	32.06	55.901	.635	.874	<0.001
PA1	32.12	51.940	.785	.858	<0.001
PA2	32.08	51.976	.797	.857	<0.001
PA3	31.69	58.437	.582	.879	<0.001
Refinement from initial model: Delete PA4.					
Co-created value (CV): Cronbach's Alpha=0.966, AVE=0.832, Composite Reliability=0.972					
CV1	27.89	69.827	.831	.964	<0.001
CV2	27.89	68.636	.893	.960	<0.001
CV3	27.95	70.338	.855	.962	<0.001
CV4	27.76	69.099	.900	.959	<0.001
CV5	27.88	68.629	.889	.960	<0.001
CV6	27.89	68.535	.916	.958	<0.001
CV7	27.97	68.747	.866	.962	<0.001
Refinement from initial model: Delete CV8					

References

- Banker, R.D. and Bardhan, I.R. et al. (2006). Plant information systems, manufacturing capabilities, and plant performance. *MIS Quarterly*, 30(2), 315-337.
- Bharadwaj, S. and Bharadwaj, A. et al. (2007). The performance effects of complementarities between information systems, marketing, manufacturing, and supply chain processes. *Information Systems Research*, 18(4), 437-453.
- Bhatt, G.D. and Grover, V. (2005). Types of information technology capabilities and their role in competitive advantage: An empirical study. *Journal of Management Information Systems*, 22(2), 253-277.
- Biggemann, S. and Buttle, F. (2012). Intrinsic value of business-to-business relationships: An empirical taxonomy. *Journal of Business Research*, 65, 1132-1138.
- Bunduchi, R. (2005). Business relationships in internet-based electronic markets: the role of goodwill trust and transaction costs. *Information Systems Journal*, 15(4), 321-341.
- Burton-Jones, A. (2009). Minimizing method bias through programmatic research. *MIS Quarterly*, 33(3), 445-471.
- Chong, J.L.L. and TAN, F.B. (2012). IT governance in collaborative networks: A socio-technical perspective. *Pacific Asia Journal of the Association for Information Systems*, 4(2), Article 3.
- Day, G.S. et al. (2004). Invited Commentaries on “Evolving to a new dominant logic for marketing”. *Journal of Marketing*, 68(1), 18-27.
- Dyer, J.H. (2000). *Collaborative advantage: Winning through extended enterprise supplier networks*. New York: Oxford University Press.
- Dyer, J.H. and Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660-679.
- Gallivan, M.J. and Depledge, G. (2003). Trust, control and the role of interorganizational systems in electronic partnerships. *Information Systems Journal*, 13, 159-190.
- Grant, G. and Tan, F.B. (2013). Governing IT in inter-organizational relationships: Issues and future research. *European Journal of Information Systems*, 22 (5SI), 493-497.
- Grant, R. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science*, 7, 375-387.
- Hendricks, K.B. and Singhal, V.R. et al. (2007). The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations. *Journal of Operations Management*, 25(1), 65-82.
- Hinkin, T.R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1(1), 104-121.
- Jayachandran, S. and Sharma, S. et al. (2005). The role of relational information processes and technology use in customer relationship management. *Journal of Marketing*, 69(4), 177-192.

- King, N. (2013). Exploring the impact of operating model choice on the governance of inter-organizational workflow: the US e-prescribing network. *European Journal of Information Systems*, 22(5SI), 548-568.
- Kohli, R. and Grover, V. (2008). Business value of IT: An essay on expanding research directions to keep up with the times. *Journal of the Association for Information Systems*, 9(1), 23-39.
- Kraemer, K. and Dedrick J. et al. (2006). *Global E-Commerce Impacts of National Environments and Policy*. Cambridge University Press, Cambridge, UK.
- Krishnan, M.S. and Rai, A. et al. (2007). The digitally enabled extended enterprise in a global economy. *Information Systems Research*, 18 (3), 233-236.
- Malhotra, A. and Gosain, S. et al. (2007). Leveraging standard electronic business interfaces to enable adaptive supply chain partnerships. *Information Systems Research*, 18(3), 260-279.
- Malhotra, N.K. and Kim, S.S. et al. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science*, 52(12), 1865-1883.
- Melville, N. and Kraemer, K. et al. (2004). Review: Information technology and organizational performance: An integrative model of IT business value. *MIS Quarterly*, 28(2), 283-322.
- Morgan, L. and Feller, J. et al. (2013). Exploring value networks: Theorising the creation and capture of value with open source software. *European Journal of Information Systems*, 22(5SI), 569-588.
- Ngugi, I.K. (2010). Relational capabilities for value co-creation and innovation in SMEs. *Journal of Small Business and Enterprise Development*, 17(2), 260-278.
- Patnayakuni, R. and Rai, A. et al. (2006). Relational antecedents of information flow integration for supply chain coordination. *Journal of Manage Information Systems*, 23(1), 13-49.
- Podsakoff, P.M. and MacKenzie, S.B. et al. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Prahalad, C.K. and Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy & Leadership*, 32(3), 4-9.
- Provan, K.G. and FISH, A. et al. (2007). Interorganizational networks at the network level: a review of the empirical literature on whole networks. *Journal of Management*, 33(3), 479-516.
- Rai, A. and Pavlou, P.A. et al. (2012). Interfirm IT capability profiles and communications for cocreating relational value: Evidence from the logistics industry. *MIS Quarterly*, 36(1), 233-262.
- Rai, A. and Tang, X. (2010). Leveraging IT capabilities and competitive process capabilities for the management of interorganizational relationship portfolios. *Information Systems Research*, 21(3), 516-542.
- Ravichandran, T. and Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of Management Information Systems*, 21(4), 237-276.
- Robey, D. and Im, G. et al. (2008). Theoretical Foundations of Empirical Research on Interorganizational Systems: Assessing Past Contributions and Guiding Future Directions. *Journal of the Association for Information Systems*, 9(9), 497-518.
- Robicheaux, R.A. and Coleman, J.S. (1994). The structure of marketing channel relationships. *Journal of the Academy of Marketing Science*, 22(1), 38-51.
- Ross, J.W. and Beath, C.M. et al. (1996). Develop Long-Term Competitiveness Through IT Assets. *Sloan Management Review*, 38(1), 31-42.
- Saeed, K.A. and Malhotra, M.K. et al. (2005). Examining the impact of interorganizational systems on process efficiency and sourcing leverage in buyer-supplier dyads. *Decision Science*, 36(3), 365-396.
- Saraf, N. and Langdon, C.S. et al. (2007). IS application capabilities and relational value in interfirm partnerships. *Information Systems Research*, 18(3), 320-339.
- Soh, C. and Markus, M.L. (1995). How IT creates business value: A process theory synthesis. *Proceedings of the 16th International Conference on Information Systems*, 29-41.
- Straub, D.W. and Watson, R.T. (2001). Research commentary: Transformational issues in researching IS and net-enabled organizations. *Information Systems Research*, 12(4), 337-345.
- Subramani, M. (2004). How do suppliers benefit from IT use in supply chain relationships? *MIS Quarterly*, 28(1), 45-74.

- Tafti, A. and Mithas, S. et al. (2013). The effect of information technology-enabled flexibility on formation and market value of alliances. *Management Science*, 59(1), 207-225.
- Tenenhaus, M. And Vinzia, V.E. et al. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, 48(1), 159-205.
- Vargo, S.L. and Lusch, R.F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 2004, 68(1), 1-17.
- Vargo, S.L. and Lusch, R.F. (2011). It's all B2B...and beyond: Towards systems perspective of the market. *Industrial Marketing Management*, 40(2), 181-187.
- Xiao, J.H. and Xie, K. et al. (2013). Inter-firm IT governance in power-imbalanced buyer-supplier dyads: exploring how it works and why it lasts. *European Journal of Information Systems*, 22(5SI), 512-528.
- Zhu, K. and Kraemer, K.L. (2002). E-commerce metrics for net-enhanced organizations: Assessing the value of e-commerce to firm performance in the manufacturing sector. *Information Systems Research*, 13(3), 275-295.
- Zhu, K. and Kraemer, K.L. et al. (2006). Migration to open-standard interorganizational systems: Network effects, switching costs, and path dependency. *MIS Quarterly*, 30(SI), 515-539.
- Zwass, V. (2010). Co-Creation: Toward a Taxonomy and an Integrated Research Perspective . *International Journal of Electronic Commerce*, 15(1), 11-48.